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EXAMINER
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PIZIALI, JEFFREY J

ART UNIT	PAPER NUMBER
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2629

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/714,095	<b>Applicant(s)</b> SITALASAI ET AL.	
	<b>Examiner</b> Jeff Piziali	<b>Art Unit</b> 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,5,6,11-18,20-32,36 and 37 is/are pending in the application.
- 4a) Of the above claim(s) 22-24,29,36 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,6,11-18,20,21,25-28 and 30-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 3, 5, 6, 11-18, 20, 21, 25-28, and 30-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim 1 recites the subject matter: "**a printed circuit board having a plurality of circuits disposed thereon, including a detection circuit**" (lines 3-4).

The above subject matter, as claimed, is not described in the original disclosure of the invention.

Claim 1 recites the subject matter: "**a housing enclosing said ball contact and a portion of said contact pad, said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad, at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface**" (lines 9-13).

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The above subject matter, as claimed, is not described in the original disclosure of the invention.

3. Claims 1, 3, 5, 6, 11-18, 20, 21, 25-28, and 30-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 1 recites the subject matter: "**a printed circuit board having a plurality of circuits disposed thereon, including a detection circuit**" (lines 3-4).

The above subject matter, as claimed, is not enabled by the original disclosure of the invention.

Claim 1 recites the subject matter: "**a housing enclosing said ball contact and a portion of said contact pad, said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad, at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface**" (lines 9-13).

The above subject matter, as claimed, is not enabled by the original disclosure of the invention.

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4. The remaining claims are rejected under 35 U.S.C. 112, first paragraph, as being dependent upon rejected base claims.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1, 3, 5, 6, 11-18, 20, 21, 25-28, and 30-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a printed circuit board having a plurality of circuits disposed thereon, including a detection circuit**" (lines 3-4).

It would be unclear to one having ordinary skill in the art what earlier claimed element, if any, is intended to "includ[e] a detection circuit." Does the printed circuit board include a detection circuit? Or do the circuits include a detection circuit? Or does the optical mouse system include a detection circuit?

An omitted structural cooperative relationship results from the claimed subject matter: "**a contact pad**" (line 5) and "**contact pad**" (line 11).

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It would be unclear to one having ordinary skill in the art whether these limitations are intended to be identical to, or distinct from, one another.

An omitted structural cooperative relationship results from the claimed subject matter: "**a housing enclosing said ball contact and a portion of said contact pad, said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad, at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface**" (lines 9-13).

It would be unclear to one having ordinary skill in the art how it is possible for a housing to "encase" a contact pad (comprising a plurality of stationary contacts), when the stationary contacts extend beyond an interior of the housing.

If the stationary contacts extend beyond the housing, then how can it be reasonably be said that the housing "encases" the stationary contacts?

8. Claim 1 recites the limitation "**said ball**" (line 11). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art whether this limitation is intended to be identical to, or distinct from, the earlier recited "ball contact" (line 7).

9. Claim 3 recites the limitation "**said trigger signal output**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

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10. Claim 3 recites the limitation "**wake-up signal output**" (line 2). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art what earlier claimed element, if any, is intended to be "awoken" by the "signal output."

11. Claim 11 recites the limitation "**said at least one stationary contact**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

12. Claim 12 recites the limitation "**said at least one stationary contact**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

13. Claim 13 recites the limitation "**the at least one stationary contact**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

14. Claim 20 recites the limitation "**the plurality of stationary contacts**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art whether this limitation is intended to refer to the earlier claimed "a plurality of stationary contacts" (claim 1, line 5) and/or "at least two of said stationary contacts" (claim 1, line 11).

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15. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**there are at least 2 stationary contacts**" (claim 21, line 1), "**a plurality of stationary contacts**" (claim 1, line 5), and/or "**at least two of said stationary contacts**" (claim 1, line 11).

It would be unclear to one having ordinary skill in the art whether these limitations are intended to be identical to, common to, or distinct from one another.

16. Claim 27 recites the limitation "**said stationary contact**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

17. Claim 28 recites the limitation "**said motion sensor**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

18. Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a housing**" (claim 28, line 2) and "**a housing**" (claim 1, line 9).

It would be unclear to one having ordinary skill in the art whether these limitations are intended to be identical to, common to, or distinct from one another.



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19. Claim 30 recites the limitation "**said housing**" (line 1). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art whether this limitation is intended to refer to the earlier claimed "a housing" (claim 28, line 2) and/or "a housing" (claim 1, line 9).

20. Claim 32 recites the limitation "**a wake-up signal**" (line 4). There is insufficient antecedent basis for this limitation in the claim.

It would be unclear to one having ordinary skill in the art what earlier claimed element, if any, is intended to be "awoken" by the "signal."

21. The remaining claims are rejected under 35 U.S.C. 112, second paragraph, as being dependent upon rejected base claims.

22. The claims are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

As a courtesy to the Applicant, the examiner has attempted to also make rejections over prior art -- based on the examiner's best guess interpretations of the invention that the Applicant is intending to claim.

However, the indefinite nature of the claimed subject matter naturally hinders the Office's ability to search and examine the application.

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Any instantly distinguishing features and subject matter that the Applicant considers to be absent from the cited prior art is more than likely a result of the indefinite nature of the claims.

The Applicant is respectfully requested to correct the indefinite nature of the claims, which should going forward result in a more precise search and examination.

### **Claim Rejections - 35 USC § 103**

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

25. Claims 1, 3, 5, 6, 11-18, 20, 21, 25, 28, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al (US 2004/0155860 A1)** in view of **Schneider (US 3,733,447 A)**, **Farag et al (US 7,233,318 B1)**, and **Knox (US 6,139,053 A)**.

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Regarding claim 1, **Wenstrand** discloses an optical mouse system [e.g., Fig. 5: 100c] comprising:

a printed circuit board [e.g., Fig. 5: illustrated mouse bottom substrate] having a plurality of circuits [e.g., Fig. 5: clock, 102, 104, 105, 106, 108] disposed thereon, including a detection circuit [e.g., Fig. 5: 104];

a motion sensor [e.g., Fig. 5: 120] having a motion signal output [e.g., interrupt signal];

a housing [e.g., Fig. 5: illustrated mouse top and side walls] enclosing said motion sensor,

said housing disposed on said major surface of said printed circuit board and encasing said motion sensor,

at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface, and

wherein the detection circuit is connected to said motion signal output and has a trigger signal output [e.g., movement information].

(see the entire document, including Paragraphs 43-46).

**Wenstrand** only mentions in passing using a motion sensor, and does not expressly disclose structural/mounting details of the motion sensor.

However, **Schneider** discloses a system comprising:

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a printed circuit board [e.g., Figs. 1, 2, 8: 10] having a plurality of circuits [e.g., circuit pairs] disposed thereon, including a detection circuit (e.g., see Column 1, Line 55 - Column 2, Line 65);

a contact pad comprising a plurality of stationary contacts [e.g., Figs. 1, 2, 8: 11, 11a, 11b, 11c, 11d, 11e, 11f and 11g] disposed on a major surface of said printed circuit board;

a ball contact [e.g., Figs. 3, 8: 50] movably disposed atop said stationary contacts of said contact pad; and

a housing [e.g., Figs. 4, 6, 8: 40] enclosing said ball contact and a portion of said contact pad,

said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad,

at least two of said stationary contacts extending [e.g., Figs. 2, 6, 8: via 13-15, 21-24] along said major surface beyond an interior of said housing from between said housing and said major surface,

the detection circuit connected to said at least two of said stationary contacts

(see the entire document, including Column 3, Line 23 - Column 4, Line 31).

**Wenstrand** and **Schneider** are analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Wenstrand's** motion sensor [e.g., Fig. 5: 120] with **Schneider's** motion sensor [**Schneider**: Fig. 6], so as to provide a motion sensor that is nearly uniform motion

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responsive, simple in structure, rugged in construction, resistant to environmental oxidation, small in size, and readily variable in sensitivity to tilting motions [**Schneider**: Column 1, Lines 48-52].

Should it be shown that the combination of **Wenstrand** and **Schneider** discloses a printed circuit board, as instantly claimed, with insufficient specificity:

**Farag** discloses an optical mouse system [e.g., Fig. 8: 100] comprising:

a printed circuit board [e.g., Fig. 8: 108] having a plurality of circuits disposed thereon, including a detection circuit [e.g., Fig. 8: 112];

a motion sensor [e.g., Fig. 8: 110] disposed on a major surface of said printed circuit board; and

a housing [e.g., Fig. 14: 252] enclosing said motion sensor,  
said housing disposed on said major surface of said printed circuit board and encasing said motion sensor,

the detection circuit connected to said motion sensor

(see the entire document, including Column 9, Line 53 - Column 16, Line 48).

**Wenstrand**, **Schneider**, and **Farag** are analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use **Farag's** technique of forming detection circuitry and motion sensors on a single, shared printed circuit board with **Wenstrand's** and **Schneider's** combined optical mouse

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system, so as to provide a unibody mouse with improved form, feel, and functionality and increased rigidity and compactness.

Should it be shown that the combination of **Wenstrand**, **Schneider**, and **Farag** still discloses a printed circuit board, as instantly claimed, with insufficient specificity:

**Knox** discloses a system comprising:

a printed circuit board [e.g., Figs. 1, 7, 8: 108] having a plurality of circuits disposed thereon, including a detection circuit [e.g., see Figs. 7, 8: illustrated circuits];

a contact pad [e.g., Figs. 7, 8: 601] comprising a plurality of stationary contacts [e.g., Fig. 1: 107] disposed on a major surface of said printed circuit board;

a ball [e.g., Fig. 1: 101] contact movably disposed atop said stationary contacts of said contact pad; and

a housing [e.g., Fig. 1: 104] enclosing said ball contact and a portion of said contact pad, said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad,

at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface,

the detection circuit connected to said at least two of said stationary contacts

(e.g., see the entire document, including Column 3, Line 64 - Column 6, Line 25).

**Wenstrand**, **Schneider**, **Farag**, and **Knox** are analogous art, because they are from the shared field of motion sensing circuitry.

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Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use **Knox'** technique of forming circuitry and motion sensors on a single, shared printed circuit board with **Farag's**, **Wenstrand's** and **Schneider's** combined optical mouse system, so as to easily mount sensor and circuitry in a commonly understood and well known fashion.

Regarding claim 3, **Wenstrand** discloses said trigger signal output [e.g., movement information] is a wake-up signal output (e.g., see Paragraphs 43-46).

Regarding claim 11, **Schneider** discloses said at least one stationary contact is printed on said printed circuit board (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 12, **Schneider** discloses said at least one stationary contact has a hole [Fig. 7: 12] in a center thereof (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 13, **Schneider** discloses the at least one stationary contact has an inclined surface toward a center thereof (e.g., see Fig. 8; Column 3, Line 23 - Column 4, Line 27).

Regarding claim 28, **Schneider** discloses said motion sensor further includes a housing [Figs. 4, 6, 8: 40] and said housing is sealed (e.g., see Column 3, Line 23 - Column 4, Line 27).

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Regarding claim 31, **Schneider** discloses said contact pad and ball contact constitute an electrical switch and

said detection circuit detects a change in a state of whether said switch is opened or closed (e.g., see Column 3, Line 23 - Column 4, Line 27).

**Wenstrand** discloses said motion sensor constitutes an electrical switch [e.g., Fig. 4: 104, 110b, 118] and

said detection circuit detects a change in a state of whether said switch is opened or closed (see the entire document, including Paragraphs 43-46).

Regarding claim 32, **Schneider** discloses said detection circuit comprises:

a motion detector [e.g., Fig. 5: 104] that determines if there is a change in the opened or closed state of the electrical switch; and

a signal processing circuit [e.g., Fig. 5: 104] having a latch circuit [wherein accelerometer 120 and switches 110b, 118 inherently latch signals to CPU 104],

wherein said latch circuit creates a signal of a particular level for a period of time to generate a wake-up signal [mouse activation signal] (see the entire document, including Paragraphs 43-46).

Should it be shown that **Wenstrand** teaches such latch circuitry with insufficient specificity; the examiner takes official notice that it was commonly known and understood by



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those having ordinary skill in the art at the time of invention to incorporate signal processing circuitry with latch circuitry, so as to hold/store small amounts of data.

Regarding claim 5, **Schneider** discloses said contact pad and said ball contact constitute a mechanical motion sensor (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 6, **Schneider** discloses said contact pad and said ball contact constitute a tilt sensor (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 15, **Schneider** discloses said contact pad has a hole [Fig. 7: 12] in a center thereof, and a sensitivity of said tilt sensor is adjusted by a size of the hole (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 20, **Schneider** discloses the plurality of stationary contacts are wedge-shaped elements arranged about a central point (e.g., see Fig. 1; Column 3, Line 23 - Column 4, Line 27).

Regarding claim 21, **Schneider** discloses there are at least 2 stationary contacts (e.g., see Fig. 1; Column 3, Line 23 - Column 4, Line 27).

Regarding claim 25, **Schneider** discloses said ball contact is a conductive ball [Fig. 8: 50] (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 14, **Schneider** discloses a sensitivity of said tilt sensor is adjustable during manufacture of said tilt sensor (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 16, **Schneider** discloses the sensitivity of said tilt sensor is adjustable by a size of the ball contact (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 17, **Schneider** discloses the sensitivity of said tilt sensor is adjustable by a weight of the ball contact (e.g., see Column 3, Line 23 - Column 4, Line 27).

Regarding claim 18, **Schneider** discloses the sensitivity of said tilt sensor is adjustable by a conductivity of the ball contact (e.g., see Column 3, Line 23 - Column 4, Line 27).

26. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al** (US 2004/0155860 A1), **Schneider** (US 3,733,447 A), **Farag et al** (US 7,233,318 B1), and **Knox** (US 6,139,053 A) as applied to claim 6, and further in view of **Davis** (US 4,196,429 A).

Regarding claim 26, neither **Schneider** nor **Wenstrand** expressly discloses a motion sensor having a gold-plated ball contact.

However, **Davis** does disclose a motion sensor having a gold-plated ball contact [Fig. 2; 46] (Column 4, Lines 9-14).

**Wenstrand, Schneider, Farag, Knox, and Davis** are all analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Schneider's** conductor ball [**Schneider**: Fig. 3: 50] with **Davis'** gold plated contacts [**Davis**: Column 3, Lines 64 and Column 4, Line 11] so as to provide a conductor having excellent electrical conductivity while minimizing oxidation [**Davis**: Column 4, Line 12].

Regarding claim 27, neither **Schneider** nor **Wenstrand** expressly discloses a motion sensor having a gold-plated stationary contact.

However, **Davis** does disclose a motion sensor having gold-plated stationary contacts [Fig. 2; 32 & 36] (Column 3, Lines 63-68).

27. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al** (US 2004/0155860 A1), **Schneider** (US 3,733,447 A), **Farag et al** (US 7,233,318 B1), and **Knox** (US 6,139,053 A) as applied to claim 28 above, and further in view of **Kato et al** (US 5,837,951 A).

Regarding claim 30, neither **Schneider** nor **Wenstrand** expressly discloses a motion sensor housing being sealed with an adhesive.

However, **Kato** does disclose a motion sensor housing being sealed with an adhesive (Fig. 35; Column 30, Lines 37-40).

**Wenstrand, Schneider, Farag, and Knox, and Kato** are all analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Schneider's** seals [**Schneider**: Column 3, Lines 58-66] with **Kato's** seals [**Kato**: Column 30, Lines 37-40 and Column 33, Lines 47-52] so as to securely seal the resulting motion sensor without need for welding work [**Kato**: Column 30, Lines 24-26].

28. Claims 1, 3, 5, 6, 12-18, 20, 21, 25, 28, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al (US 2004/0155860 A1)** in view of **Chou (US 6,559,396 B1)**, **Farag et al (US 7,233,318 B1)**, and **Knox (US 6,139,053 A)**.

Regarding claim 1, **Wenstrand** discloses an optical mouse system [e.g., Fig. 5: 100c] comprising:

a printed circuit board [e.g., Fig. 5: illustrated mouse bottom substrate] having a plurality of circuits [e.g., Fig. 5: clock, 102, 104, 105, 106, 108] disposed thereon, including a detection circuit [e.g., Fig. 5: 104];

a motion sensor [e.g., Fig. 5: 120] having a motion signal output [e.g., interrupt signal];

a housing [e.g., Fig. 5: illustrated mouse top and side walls] enclosing said motion sensor,

said housing disposed on said major surface of said printed circuit board and encasing said motion sensor,

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at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface, and

wherein the detection circuit is connected to said motion signal output and has a trigger signal output [e.g., movement information].

(see the entire document, including Paragraphs 43-46).

**Wenstrand** only mentions in passing using a motion sensor, and does not expressly disclose structural/mounting details of the motion sensor.

However, **Chou** discloses a system comprising:

a printed circuit board [Figs. 7, 8, 10: 60] having a plurality of circuits disposed thereon, including a detection circuit [Figs. 5, 7, 8, 10: 40-42, 62];

a contact pad comprising a plurality of stationary contacts [Figs. 5, 7, 8, 10: 40-42, 62] disposed on a major surface [Figs. 7, 8, 10: 61] of said printed circuit board;

a ball contact [Figs. 5, 7, 8, 10: 30] movably disposed atop said stationary contacts of said contact pad; and

a housing [Figs. 4, 5, 7, 8, 10: 20] enclosing said ball contact and a portion of said contact pad,

said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad,

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at least two of said stationary contacts [Figs. 5, 7, 8, 10: 40-42, 62] extending along said major surface beyond an interior of said housing from between said housing and said major surface,

the detection circuit connected to said at least two of said stationary contacts (see the entire document, including Column 2, Line 65 - Column 4, Line 55).

**Wenstrand** and **Chou** are analogous art, because they are from the shared field of motion sensor circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Wenstrand's** motion sensor [e.g., Fig. 5: 120] with **Chou's** motion sensor [**Chou**: Fig. 7: 100], so as to provide a motion sensor which can maintain an electrical connection even when jerked by a slight tilting force, and thereby prevent undesired electrical connection interruptions [**Chou**: Column 1, Lines 32-42].

Should it be shown that the combination of **Wenstrand** and **Chou** discloses a printed circuit board, as instantly claimed, with insufficient specificity:

**Farag** discloses an optical mouse system [e.g., Fig. 8: 100] comprising:

a printed circuit board [e.g., Fig. 8: 108] having a plurality of circuits disposed thereon, including a detection circuit [e.g., Fig. 8: 112];

a motion sensor [e.g., Fig. 8: 110] disposed on a major surface of said printed circuit board; and

a housing [e.g., Fig. 14: 252] enclosing said motion sensor,

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said housing disposed on said major surface of said printed circuit board and encasing said motion sensor,

the detection circuit connected to said motion sensor

(see the entire document, including Column 9, Line 53 - Column 16, Line 48).

**Wenstrand, Chou, and Farag** are analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use **Farag's** technique of forming detection circuitry and motion sensors on a single, shared printed circuit board with **Wenstrand's** and **Chou's** combined optical mouse system, so as to provide a unibody mouse with improved form, feel, and functionality and increased rigidity and compactness.

Should it be shown that the combination of **Wenstrand, Chou, and Farag** still discloses a printed circuit board, as instantly claimed, with insufficient specificity:

**Knox** discloses a system comprising:

a printed circuit board [e.g., Figs. 1, 7, 8: 108] having a plurality of circuits disposed thereon, including a detection circuit [e.g., see Figs. 7, 8: illustrated circuits];

a contact pad [e.g., Figs. 7, 8: 601] comprising a plurality of stationary contacts [e.g., Fig. 1: 107] disposed on a major surface of said printed circuit board;

a ball [e.g., Fig. 1: 101] contact movably disposed atop said stationary contacts of said contact pad; and

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a housing [e.g., Fig. 1: 104] enclosing said ball contact and a portion of said contact pad, said housing disposed on said major surface of said printed circuit board and encasing said ball and contact pad,

at least two of said stationary contacts extending along said major surface beyond an interior of said housing from between said housing and said major surface,

the detection circuit connected to said at least two of said stationary contacts

(e.g., see the entire document, including Column 3, Line 64 - Column 6, Line 25).

**Wenstrand, Chou, Farag, and Knox** are analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use **Knox'** technique of forming circuitry and motion sensors on a single, shared printed circuit board with **Farag's, Wenstrand's and Chou's** combined optical mouse system, so as to easily mount sensor and circuitry in a commonly understood and well known fashion.

Regarding claim 3, **Wenstrand** discloses said trigger signal output [e.g., movement information] is a wake-up signal output (e.g., see Paragraphs 43-46).

Regarding claim 12, **Chou** discloses said at least one stationary contact has a hole [Fig. 7: 43] in a center thereof (e.g., see Column 3, Lines 39-60).



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Regarding claim 13, **Chou** discloses the at least one stationary contact has an inclined surface [Fig. 7: 421] toward a center thereof (e.g., see Column 3, Lines 39-60).

Regarding claim 28, **Chou** discloses said motion sensor further includes a housing [Figs. 4, 5, 7, 8, 10: 20] and said housing is sealed (e.g., see Column 4, Lines 12-15).

Regarding claim 31, **Chou** discloses said contact pad and ball contact constitute an electrical switch (e.g., see Column 2, Line 65 - Column 4, Line 55).

**Wenstrand** discloses said motion sensor comprises an electrical switch [e.g., Fig. 4: 104, 110b, 118] and said detection circuit detects a change in a state of whether said switch is opened or closed (see the entire document, including Paragraphs 43-46).

Regarding claim 32, **Wenstrand** discloses said detection circuit comprises:  
a motion detector [e.g., Fig. 5: 104] that determines if there is a change in the opened or closed state of the electrical switch; and

a signal processing circuit [e.g., Fig. 5: 104] having a latch circuit [wherein accelerometer 120 and switches 110b, 118 inherently latch signals to CPU 104],

wherein said latch circuit creates a signal of a particular level for a period of time to generate a wake-up signal [mouse activation signal] (see the entire document, including Paragraphs 43-46).

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Should it be shown that **Wenstrand** teaches such latch circuitry with insufficient specificity; the examiner takes official notice that it was commonly known and understood by those having ordinary skill in the art at the time of invention to incorporate signal processing circuitry with latch circuitry, so as to hold/store small amounts of data.

Regarding claim 5, **Chou** discloses said contact pad and said ball contact constitute a mechanical motion sensor (e.g., see Column 1, Lines 6-11).

Regarding claim 6, **Chou** discloses said contact pad and said ball contact constitute a tilt sensor (e.g., see Column 1, Lines 6-11).

Regarding claim 15, **Chou** discloses said contact pad has a hole [Fig. 7; 43] in a center thereof, and a sensitivity of said tilt sensor is adjusted by a size of the hole (e.g., see Column 2, Lines 1-33 -- wherein hole size inherently impacts motion sensor sensitivity).

Regarding claim 20, **Chou** discloses the plurality of stationary contacts are wedge-shaped elements arranged about a central point (e.g., see Fig. 6; Column 2, Line 65 - Column 4, Line 55).

Regarding claim 21, **Chou** discloses there are at least 2 [e.g., first and second] stationary contacts [Fig. 7; 40] (e.g., see Column 3, Lines 1-3).

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Regarding claim 25, **Chou** discloses said ball contact is a conductive ball (e.g., see Column 1, Lines 6-11).

Regarding claim 14, **Chou** discloses a sensitivity of said tilt sensor is adjustable during manufacture of said tilt sensor (e.g., see Column 2, Lines 17-33 -- wherein **Chou's** motion sensor is adjusted during manufacture to be less sensitive than a conventional motion sensor).

Regarding claim 16, **Chou** discloses the sensitivity of said tilt sensor is adjustable by a size of the ball contact (e.g., see Column 2, Lines 1-33 -- wherein ball size inherently impacts motion sensor sensitivity).

Regarding claim 17, **Chou** discloses the sensitivity of said tilt sensor is adjustable by a weight of the ball contact (e.g., see Column 2, Lines 1-33 -- wherein ball weight inherently impacts motion sensor sensitivity).

Regarding claim 18, **Chou** discloses the sensitivity of said tilt sensor is adjustable by a conductivity of the ball contact (e.g., see Column 2, Lines 1-33 -- wherein ball conductivity inherently impacts motion sensor sensitivity).

29. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al** (US 2004/0155860 A1), **Chou** (US 6,559,396 B1), **Farag et al** (US 7,233,318 B1), and **Knox**

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(US 6,139,053 A) as applied respectively to claim 1 above, and further in view of **Schneider** (US 3,733,447 A).

Regarding claim 11, **Chou** arguably does not disclose said at least one stationary contact is printed on said printed circuit board.

However, **Schneider** discloses said at least one stationary contact is printed on said printed circuit board (see Column 3, Line 23 - Column 4, Line 27).

**Wenstrand, Schneider, Farag, Knox, and Schneider** are all analogous art, because they are from the shared field of tilt/motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use **Schneider's** printing technique to form **Chou's** stationary contacts, so as make inexpensive and readily prepared stationary contacts [**Schneider**: Column 1, Line 55 - Column 2, Line 42].

30. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al** (US 2004/0155860 A1), **Chou** (US 6,559,396 B1), **Farag et al** (US 7,233,318 B1), and **Knox** (US 6,139,053 A) as applied to claim 6, and further in view of **Davis** (US 4,196,429 A).

Regarding claim 26, neither **Chou** nor **Wenstrand** expressly discloses a motion sensor having a gold-plated ball contact.

However, **Davis** does disclose a motion sensor having a gold-plated ball contact [Fig. 2; 46] (Column 4, Lines 9-14).

**Wenstrand, Schneider, Farag, Knox**, and **Davis** are all analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Chou's** copper/steel conductor ball [**Chou**: Column 3, Lines 23-25] with **Davis'** gold plated contacts [**Davis**: Column 3, Lines 64 and Column 4, Line 11] so as to provide a conductor having excellent electrical conductivity while minimizing oxidation [**Davis**: Column 4, Line 12].

Regarding claim 27, neither **Chou** nor **Wenstrand** expressly discloses a motion sensor having a gold-plated stationary contact.

However, **Davis** does disclose a motion sensor having gold-plated stationary contacts [Fig. 2; 32 & 36] (Column 3, Lines 63-68).

31. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wenstrand et al** (US 2004/0155860 A1), **Chou** (US 6,559,396 B1), **Farag et al** (US 7,233,318 B1), and **Knox** (US 6,139,053 A) as applied to claim 28 above, and further in view of **Kato et al** (US 5,837,951 A).

Regarding claim 30, neither **Chou** nor **Wenstrand** expressly discloses a tilt switch housing being sealed with an adhesive.

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However, **Kato** does disclose a tilt switch housing being sealed with an adhesive (Fig. 35; Column 30, Lines 37-40).

**Wenstrand, Schneider, Farag, Knox**, and **Kato** are all analogous art, because they are from the shared field of motion sensing circuitry.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to replace **Chou's** seals [**Chou**: Column 4, Lines 12-15] with **Kato's** seals [**Kato**: Column 30, Lines 37-40 and Column 33, Lines 47-52] so as to securely seal the resulting tilt switch without need for welding work [**Kato**: Column 30, Lines 24-26].

### Response to Arguments

32. Applicant's arguments filed on 9 November 2010 have been fully considered but they are not persuasive.

The Applicant contends, "The art of record teach variations of a motion sensor that is a discrete device, separate from a printed circuit board of a mouse device. None of the references teach a printed circuit board of an optical mouse, where a contact pads and a ball (which comprise the motion sensor) are deposited on the printed circuit board" (see Page 8 of the Response filed on 9 November 2010). However, the examiner respectfully disagrees.

**Schneider** discloses a system comprising: a printed circuit board [e.g., Figs. 1, 2, 8: 10] having a plurality of circuits [e.g., circuit pairs] disposed thereon, including a detection circuit (e.g., see Column 1, Line 55 - Column 2, Line 65);

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a contact pad comprising a plurality of stationary contacts [e.g., Figs. 1, 2, 8: 11, 11a, 11b, 11c, 11d, 11e, 11f and 11g] disposed on a major surface of said printed circuit board;

a ball contact [e.g., Figs. 3, 8: 50] movably disposed atop said stationary contacts of said contact pad; and

a housing [e.g., Figs. 4, 6, 8: 40] enclosing said ball contact and a portion of said contact pad (see the entire document, including Column 3, Line 23 - Column 4, Line 31).

Moreover, **Chou** discloses a system comprising: a printed circuit board [Figs. 7, 8, 10: 60] having a plurality of circuits disposed thereon, including a detection circuit [Figs. 5, 7, 8, 10: 40-42, 62];

a contact pad comprising a plurality of stationary contacts [Figs. 5, 7, 8, 10: 40-42, 62] disposed on a major surface [Figs. 7, 8, 10: 61] of said printed circuit board;

a ball contact [Figs. 5, 7, 8, 10: 30] movably disposed atop said stationary contacts of said contact pad; and

a housing [Figs. 4, 5, 7, 8, 10: 20] enclosing said ball contact and a portion of said contact pad (see the entire document, including Column 2, Line 65 - Column 4, Line 55).

Applicant's arguments with respect to claims 1, 3, 5, 6, 11-18, 20, 21, 25-28, and 30-32 have been considered but are moot in view of the new ground(s) of rejection.

By such reasoning, rejection of the claims is deemed necessary, proper, and thereby maintained at this time.

### Conclusion

33. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chanh Nguyen can be reached on (571) 272-7772. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeff Piziali/  
Primary Examiner, Art Unit 2629  
13 January 2011